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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,293	03/21/2006	George C. Giakos	089498.0483.US	3326
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ROETZEL AND ANDRESS 222 SOUTH MAIN STREET AKRON, OH 44308			EXAMINER UNDERWOOD, JARREAS C	
			ART UNIT 2877	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/560,293	<b>Applicant(s)</b> GIAKOS, GEORGE C.	
	<b>Examiner</b> Jarreas C. Underwood	<b>Art Unit</b> 2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of copending Application No. 11/129769. Although the conflicting claims are not identical, they are not patentably distinct from each other because aside from minor grammatical choices (e.g. "wavelength being different" instead of "wavelength is different") the apparatus comprises the same physical components. Examiner sees the "light image-capture device" of 11/129769 as not different than the "optical image-capture device" of claim 1.
2. Similarly, claims 4, 6 and 11 are rejected over claims 13, 15 and 21, respectively.
3. Claims 5, 8 and 9 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 14, 17 and 18 respectively, of copending Application No. 11/129769. Although the conflicting claims are not identical, they are not patentably distinct from each other because aside from minor grammatical choices (e.g. "wavelength being different" instead of "wavelength is different") the limitations describe the same physical positions or geometries.
4. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Drawings***

5. The drawings are objected to because Figure 4 is illegible. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to

avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

6. Applicant is reminded of the proper language and format for an abstract of the disclosure. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 8-10, 12-14, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (United States Patent 7,061,614) in view of Garcia et al (United States Patent 6,927,888), and in further view of Brophy et al (United States Patent 5,129,724).

7. As to claim 1, Yang teaches a multi-energy polarization imaging system comprising:

a light source (figure 1, element 12) for illuminating a target with a first quantity of light having a first wavelength and a second quantity of light having a second wavelength, wherein the second wavelength is different than the first wavelength (column 5, lines 41-43);

a polarization-state generator (Figure 6, element 16) for generating a polarization state for each of the first and second quantities of light,;

a polarization-state receiver (Figure 6, element 34) for evaluating a resulting polarization state of the first and second quantities of light following illumination of the target, the polarization-state receiver comprising a second waveplate (Figure 6, element 52) through which the first and second quantities of light are transmitted before entering a second polarizer (Figure 6, element 54);

an optical image-capture device (Figure 6, element 24) for capturing a first image of the target illuminated by the first quantity of light (Figure 6, element 70) and a second

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image of the target illuminated by the second quantity of light (Figure 6, element 72);  
and

a processing unit for assigning a weighting factor to at least one of the first and second images and evaluating a weighted difference between the first and second images to generate a multi-energy image of the target.

While Wang teaches a polarizer, Wang fails to teach the polarization-state generator comprising a first polarizer through which the first and second quantities of light are transmitted before entering a first waveplate. However to do so is well known as taught by Garcia. Garcia teaches the polarization-state generator comprising a first polarizer (Figure 1, element P1) through which the first and second quantities of light are transmitted before entering a first waveplate (Figure 1, element QWP1). It would have been obvious to one of ordinary skill in the art at the time of invention to have the polarization-state generator comprise a first polarizer through which the first and second quantities of light are transmitted before entering a first waveplate, in order to allow the calculation of Mueller matrix elements.

While Wang teaches a processing unit (Figure 6, element 26), Wang fails to teach the processing unit assigns a weighting factor to at least one of the first and second images and evaluates a weighted difference between the first and second images to generate a multi-wavelength image of the target. However to do so is well known as taught by Brophy. Brophy teaches the processing unit assigning a weighting factor to at least one of the first and second images and evaluating a weighted difference between the first and second images to generate a multi-wavelength image

of the target (column 2, line 36 – column 3, line 1). It would have been obvious to one of ordinary skill in the art at the time of invention to have the processing unit assign a weighting factor to at least one of the first and second images and evaluate a weighted difference between the first and second images to generate a multi-wavelength image of the target, in order to simultaneously measure multiple properties.

8. As to claim 2, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches the optical image-capture device is a charge-coupled device (column 9, lines 56-58).

9. As to claim 3, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 2, in addition Wang teaches the charge-coupled device is positioned in optical alignment with the polarization-state receiver to capture the first and second images (Figure 6, elements 16, 28, 20, 28, 34, 24).

10. As to claim 4, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches the light source comprises a laser (column 5, lines 26-30).

11. As to claim 5, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches the at least one light source is configured to emit light in a planar geometry, fan-beam geometry, pointwise irradiation, or any combination thereof (column 5, lines 26-30).

12. As to claim 6, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Garcia teaches the first and second waveplates are each a quarter-wave retarder (Figure 1, elements QWP1, QWP2). It



would have been obvious to one of ordinary skill in the art at the time of invention to have the first and second waveplates are each a quarter-wave retarder, in order to provide the proper matrix element configurations.

13. As to claim 8, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches the polarization-state generator and the polarization-state receiver are generally linearly aligned on opposite sides of the target (Figure 6, elements 16, 20, 34).

14. As to claim 9, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches the polarization-state receiver is positioned to evaluate the resulting polarization state of each quantity of light reflected by the target (Figure 6, elements 16, 28, 20, 28, 34).

15. As to claim 10, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Wang teaches a computer readable memory (Figure 6, element 26) for storing information to be used by the processing unit for determining a suitable wavelength for each of the first and second quantities of light. While Wang does not explicitly teach a memory, Wang teaches that "a processor records and analyzes those signals." Examiner's position is that a processor capable of storing signals would inherently include a computer readable memory.

16. As to claim 12, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 1, in addition Garcia teaches the image-capture device converts the first captured image into a first Mueller matrix of the target and the second captured image into a second Mueller matrix of the target (column 23, lines 34-

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59). It would have been obvious to one of ordinary skill in the art at the time of invention to have the image-capture device convert the first captured image into a first Mueller matrix of the target and the second captured image into a second Mueller matrix of the target, in order to allow the best polarization state to be chosen.

17. As to claim 13, the method would flow from the apparatus of claim 1.

18. As to claim 14, the method would flow from the apparatus of claim 1. Examiner refers applicant to Garcia column 7, lines 57-62. It would have been obvious to one of ordinary skill in the art at the time of invention to use linear polarizers, in order to allow study of the separate components of light.

19. As to claim 16, the method would flow from the apparatus of claim 1, with the exception of determining a Mueller matrix for each of the first and second images. However to do so is well known as taught by Garcia. Garcia teaches determining a Mueller matrix for each of the first and second images (column 23, lines 23-59). It would have been obvious to one of ordinary skill in the art at the time of invention to the step of weighting at least one of the first and second images comprises the steps of: determining a Mueller matrix for each of the first and second images, in order to allow the best polarization state to be chosen.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Garcia in view of Brophy, and in further view of Furtak (United States Patent 6,384,916).

20. As to claim 15, Wang in view of Garcia in view of Brophy discloses everything claimed, as applied above in claim 13, with the exception of the step of analyzing the

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resulting polarization state comprises the steps of: analyzing a resulting phase angle between the ordinary and extraordinary components of the first and second quantities of light following interaction of the first and second quantities of light with the target.

However to do so is well known as taught by Furtak. Furtak teaches the step of analyzing the resulting polarization state comprises the steps of: analyzing a resulting phase angle between the ordinary and extraordinary components of the first and second quantities of light following interaction of the first and second quantities of light with the target (column 13, lines 25-65). It would have been obvious to one of ordinary skill in the art at the time of invention to include the step of analyzing the resulting polarization state comprise the steps of: analyzing a resulting phase angle between the ordinary and extraordinary components of the first and second quantities of light following interaction of the first and second quantities of light with the target, in order to reduce the volume of the Poincaré sphere.

***Allowable Subject Matter***

21. Claims 7, 11, 17 and 18 would be allowable if the provisional rejection on the ground of nonstatutory obviousness-type double patenting, as set forth in this Office action, is overcome and the claims rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

22. As to claim 7, the prior art of record, taken alone or in combination, fails to disclose or render obvious the quarter-wave retarders forming the first and second

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waveplates are rotated at an angular-velocity ratio of 5:1, in combination with the rest of the limitations of the claim.

23. As to claim 11, the prior art of record, taken alone or in combination, fails to disclose or render obvious the processing unit comprises an artificial fuzzy neural network that uses information stored in the computer readable memory to determine a suitable wavelength for each of the first and second quantities of light for the conditions at a time when the multi-energy image is to be generated, in combination with the rest of the limitations of the claim.

24. As to claim 17, the prior art of record, taken alone or in combination, fails to disclose or render obvious determining a difference between the at least one weighted image and the remaining image; generating a Mueller matrix for the difference between the two images; and displaying an image generated from the Mueller matrix for the difference between the two images, in combination with the rest of the limitations of the claim.


25. As to claim 18, the prior art of record, taken alone or in combination, fails to disclose or render obvious determining suitable first and second wavelengths based on the comparison between the evaluated ambient environment of the target and the known environments in the computer readable memory using an artificial fuzzy neural network, in combination with the rest of the limitations of the claim.

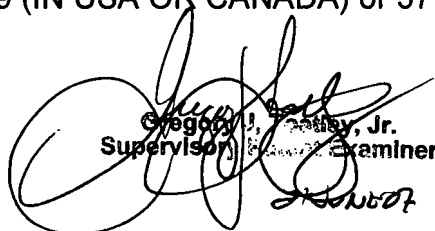
**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jarreas C. Underwood whose telephone number is (575) 272-1536. The examiner can normally be reached on Monday-Friday 0530-1400.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Jarreas Underwood  
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Art Unit 2877  
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